

Claims

1. A catalyst for autothermal catalytic reforming of hydrocarbons, said catalyst comprising:
 - (a) a support; and
 - (b) a multilayer catalyst substance, wherein said multilayer catalyst substance is applied to said support and said multilayer catalyst substance comprises:
 - (i) a lower catalyst layer, wherein said lower catalyst layer contacts said support and said lower catalyst layer is capable of preferentially catalyzing partial oxidation; and
 - (ii) an upper catalyst layer, wherein said upper catalyst is capable of preferentially catalyzing steam reforming.
2. The catalyst according to claim 1, wherein the lower catalyst layer comprises platinum at a concentration of 0.1 to 5% by weight based on the total weight of the catalyst and the upper catalyst layer comprises rhodium at a concentration of 0.1 to 5% by weight, based on the total weight of the catalyst.
3. The catalyst according to claim 2, wherein the lower catalyst layer and the upper catalyst layer each further comprises noble metals, rare earth metals and base metals of the subgroup elements.
4. The catalyst according to claim 3, wherein the lower catalyst layer and the upper catalyst layer each further comprises a metal selected from the 8th subgroup elements on an oxide support material, wherein said oxide support material is selected from the group consisting of aluminum oxide, silicon dioxide, titanium dioxide, boron oxide, bismuth oxide, gallium oxide, oxides of the alkali metals,

oxides of the alkaline earth metals, oxides of the subgroup elements, rare earth oxides, mixtures of those oxides, and zeolites.

5. The catalyst according to claim 4, wherein the catalyst substance is located on a monolithic support having a length L and is penetrated from an inlet surface to an outlet surface by flow channels, comprising a lower catalyst layer applied directly on the support and an upper catalyst layer lying on the lower catalyst layer, with the lower catalyst layer applied over the full length of the support and the upper layer applied only to part of the lower catalyst layer.
6. The catalyst according to claim 5, wherein said catalyst further comprises a third catalyst layer, wherein said third catalyst layer is capable of carbon monoxide conversion and is applied to part of the upper catalyst layer.
7. The catalyst according to claim 6, wherein the third catalyst layer comprises as catalytically active components at least one noble metal selected from the group consisting of Pt, Pd, Rh, Ru, Ir, Os and Au, and said at least one noble metal is located on an oxide support material selected from the group consisting of aluminum oxide, silicon dioxide, titanium dioxide, rare earth oxides, mixtures of those oxides and zeolites.
8. The catalyst according to claim 7, wherein the third catalyst layer further comprises at least one rare earth metal and at least one base metal selected from the subgroup elements.
9. A process for autothermal catalytic steam reforming of hydrocarbons, said process comprising passing a starting mixture of hydrocarbons, oxygen and water or steam, heated to a preheat temperature, over a multilayer catalyst, wherein said process is operated adiabatically and said multilayer catalyst is comprised of a support and a coating, wherein said coating is comprised of a multilayer catalyst substance in which a lower catalyst layer is capable of preferentially catalyzing

partial oxidation and an upper catalyst layer is capable of preferentially catalyzing steam reforming.

10. The process according to claim 9, wherein the lower catalyst layer comprises platinum at a concentration of 0.1 to 5% by weight based on the total weight of the catalyst and the upper catalyst layer comprises rhodium at a concentration of 0.1 to 5% by weight, based on the total weight of the catalyst.
11. The process according to claim 10, wherein the upper catalyst layer and the lower catalyst layer each comprises a metal selected from the 8th subgroup elements on an oxide support material, wherein said oxide support material is selected from the group consisting of aluminum oxide, silicon dioxide, titanium dioxide, boron dioxide, bismuth oxide, gallium oxide, oxides of the alkali metals, oxides of the alkaline earth metals, oxides of the subgroup elements, rare earth oxides, mixtures of those oxides, and zeolites at a concentration of up to 70% by weight based on the total weight of the catalyst.
12. A method of autothermal catalytic steam reforming comprising using the catalyst of claim 1.
13. A reformer for catalytic steam reforming of hydrocarbons to generate hydrogen for a fuel cell system, wherein said reformer comprises the catalyst of claim 1.